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1987 SALARIES OF NON-ACADEMIC CHEMICAL ENGINEERS

ANALYSIS OF THE AMERICAN CHEMICAL SOCIETY'S 1987 SURVEY OF SALARIES AND EMPLOYMENT

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ACKNOWLEDGEMENTS

Each year, the American Chemical Society conducts salary surveys of its members. This report is one of four presenting detailed results of the 1987 Salary and Employment Status Survey. The four reports are: *1987 Salaries of Non-academic Chemists, 1987 Salaries of Academic Chemists, 1987 Salaries of Non-academic Chemical Engineers,* and *1987 Employment Status and Demographic Characteristics of ACS Members.* A summary of the survey findings was published in the June 29, 1987 issue of *Chemical and Engineering News.*

General oversight of the survey and its analysis was provided by the ACS joint Board-Council Committee on Economic Status, headed by Valerie D. Kuck[1], and by its subcommittee on surveys, chaired by Jack G. Kay[2]. The committee expresses its gratitude to the 12,000 ACS members who provided a valuable service to the profession by completing the survey questionnaire.

Joan Burrelli and Nguyen Bailey of ACS Statistical Services, managed by John Robert Jones, conducted this year's survey and prepared this report. Dr. Burrelli wrote the summary and comment on the following pages.

Robert K. Neuman, Head
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SUMMARY AND COMMENT

Joan S. Burrelli*

This year, for the first time, the ACS is producing a separate report on chemical engineers' salaries. ACS member chemical engineers are, on average, older and are more likely to have PhDs than are nonmember chemical engineers. Because the salary figures in this report are presented separately according to degree and years since BS, I believe that they are accurate and represent chemical engineers salaries in the categories reported.

Salaries in Industry

Median salaries for all degree levels were higher this year than last year. The overall median salary for PhD industrial chemical engineers increased 2.5% (to $61,000) while master's degree chemical engineers reported an increase of 7% (to $51,000) and bachelor's degree chemical engineers' median salary increased 9% (to $47,100). Because the Consumer Price Index rose approximately 3% from March 1986 to March 1987, those salary increases represent increases in constant dollars for bachelor's and master's degree chemical engineers and decreases in constant dollars for PhD chemical engineers.

$61,000 for PhD, up 2.5% from 1986, down 0.5% in constant dollars
$51,000 for MS, up 7% from 1986, up 4% in constant dollars
$47,100 for BS, up 9% from 1986, up 6% in constant dollars

Salaries within industry vary according to type of industry, work function, length of experience, and degree of responsibility. Salaries for chemical engineers employed in industry are generally higher for those working in the basic chemicals and petroleum industries, those in general management or R&D management, those with greater experience, and those with greater responsibility.

Salaries differed by geographic region. The median salary of BS chemical engineers ranged from a high of $57,000 in the West South Central region to a low of $36,600 in the West North Central region. The regional differences in salaries are largely a function of differencies in type of employer. The high salaries in the West South Central region can be explained by the high proportion (more than one-third) of the chemists in this region who are employed in the petroleum industry.

As in the past, salaries for women chemical engineers were lower than those for men. The median salary for women PhDs in industry was 72% of that for men. The difference in men's and women's median salaries is largely due to differences in experience. Half of the BS women chemical engineers in the sample have less than five years of experience. When length of experience is taken into account, the salary gap narrows. For example, the median salary for BS women in industry with 2-4 years since the BS is 98% that for men with comparable experience.

NOTE: Results of the 1987 ACS Salary and Employment Status Survey are presented in a new format this year. Four separate reports: *1987 Salaries of Non-academic Chemists, 1987 Salaries of Academic Chemists, 1987 Salaries of Non-academic Chemical Engineers,* and *1987 Employment Status and Demographic Characteristics of ACS Members* replace the traditional one report. Also, the format of the tables is new. If you have comments or suggestions to make concerning this format, please contact Joan Burrelli at the ACS Office of Statistical Services (202-873-4433).

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*Dr. Burrelli is Senior Research Associate in the ACS Office of Statistical Services.

A METHOD FOR ESTIMATING AVERAGE SALARIES

A compact summary of the information in this report is possible through a statistical technique known as multiple regression. This technique identifies which characteristics have the greatest effect on salaries, and results in a formula for estimating the average salary of respondents with certain characteristics.

For industrial chemical engineers responding to the 1987 survey, the three characteristics which account for most of the variation among salaries are highest degree, experience (years since B.S. is used to measure experience in ACS surveys), and work function.

Table I displays the factors needed to estimate the average salary for any group of respondents who are industrial chemists with any combination of the listed characteristics.

For example, to estimate the average salary in March 1987 for industrial chemical engineers with the doctorate, 15 to 19 years of experience, and working in R&D management, find the corresponding factors in Table I and multiply them together with the base salary for all industrial chemical engineers:

($27,046) x (1.256) x (1.675) x (1.224) = $69,645

Table I

SALARY FACTORS FOR INDUSTRIAL CHEMICAL ENGINEERS

BASE SALARY	$27,046
DEGREE:	
Bachelor's	1.000
Master's	1.083
Doctorate	1.256
MATURITY:	
(Years Since Receiving B.S.)	
0-1	1.000
2-4	1.065
5-9	1.326
10-14	1.547
15-19	1.675
20-24	1.836
25-29	1.940
30-34	2.133
35-39	2.045
40 or more	1.936
WORK FUNCTION:	
Basic Research	1.000
R&D Management	1.224
Applied Research	0.966
General Management	1.266
Marketing	1.026
Production	0.940
Forensic/Lab Analysis	0.781
Writing	0.863
Chemistry Information Services	0.797
Data Processing	0.965
Consulting	0.982
Other	0.979

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TECHNICAL NOTES

The target population of the 1987 Salary and Employment Status Survey was those ACS members who had U.S. mailing addresses, were not older than 70, and had neither student, retired, nor emeritus status. On January 31, 1987 the ACS membership totalled 129,808, of which approximately 90,000 were eligible for inclusion in the survey. A systematic sample of 20,000 members with non-chemical engineering degrees (for the most part chemists) and all 6,965 members with chemical engineering degrees were selected from the target population.

The survey questionnaires were mailed to this sample of 26,965 members by bulk mail during the week of March 2-6. By the May 15 cut-off date, 11,982 (44.4%) usable questionnaires had been returned.

Definitions

For the purposes of the survey analysis only, the following definitions were used:

Chemical Engineer:	A respondent who indicated a work specialty of chemical engineer or a degree field of chemical engineer (category 1 of Question I.B. on the questionnaire).
Unemployed:	A respondent who is unemployed and seeking employment (category 4 of Question I.D. on the questionnaire).

This report represents the respondents' principal annual salaries as of March 1, 1987. The respondent's age is given as of March 1, 1987. A respondent's state and geographic region refer to place of residence rather than place of employment. A respondent's metropolitan area refers to place of employment. A list of geographic regions and their member states is on page 6 of this report. A list of metropolitan areas and their component 3-digit ZIP codes appears on page 7.

Small Cell Count

If the number of responses in a cell of a salary table is small, then the sample salary statistics for that cell may not accurately estimate the corresponding population salary statistics. In general, a cell containing fewer than 15 responses does not provide a useful estimate of the median salary, and a cell containing fewer than 25 responses does not provide a useful estimate of the 25th or the 75th salary percentile. For this reason, cells containing fewer than 15 responses were suppressed in the tables in this book.

GEOGRAPHIC REGIONS

PACIFIC

Alaska
California
Hawaii
Oregon
Washington

MOUNTAIN

Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

WEST NORTH CENTRAL

Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL

Arkansas
Louisiana
Oklahoma
Texas

EAST NORTH CENTRAL

Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL

Alabama
Kentucky
Mississippi
Tennessee

MIDDLE ATLANTIC

New Jersey
New York
Pennsylvania

SOUTH ATLANTIC

Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia

NEW ENGLAND

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

METROPOLITAN AREAS

Metropolitan Area	Three-Digit ZIP Codes
Atlanta, GA	300-303
Baltimore, MD	210-214
Boston, MA	017-024
Chicago, IL	463,464,600-606
Cincinnati, OH	410, 450-452, 470
Cleveland-Akron, OH	440-443
Columbus, OH	430-432
Dallas, TX	750-753, 760-762
Dayton, OH	453-455
Denver, CO	800-804
Detroit, MI	480-483
Houston-Beaumont, TX	770-777
Los Angeles, CA	900-918,926-928
Miami, FL	330-333
Newark, NJ	070-076,079
New York, NY	100-108,110-114,116
Philadelphia, PA	189-191, 193, 194
Pittsburgh, PA	150-152
St. Louis, MO	620-622, 630-633
San Francisco, CA	940-951
Washington, DC	200-209, 220-223

See *1987 National Five-Digit ZIP Code and Post Office Directory*, United States Postal Service, for the three-digit ZIP codes corresponding to the above metropolitan areas.

Table 1.1.1

SALARIES of CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and YEARS SINCE BS
1987 ACS Salary Survey

Degree and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	615	51,271	25,333	35,000	47,112	60,252
2-4	85	28,768	5,157	25,500	29,400	32,500
5-9	86	36,728	8,556	31,000	36,250	40,000
10-14	54	43,619	11,593	36,400	44,250	51,000
15-19	33	47,975	13,866	37,000	47,000	56,000
20-24	35	55,105	16,174	46,000	52,000	61,000
25-29	59	61,658	26,042	46,000	55,000	74,800
30-34	63	64,271	18,772	51,120	60,252	76,000
35-39	131	65,430	35,118	47,000	58,000	75,000
40 Or More	58	59,884	19,862	45,000	58,840	71,000
MS						
Total	495	56,449	29,988	41,000	51,000	65,000
2-4	18	32,244	3,535	31,500	32,100	34,200
5-9	89	38,251	7,104	33,600	37,000	42,780
10-14	69	54,017	55,321	41,000	45,600	52,000
15-19	51	52,952	11,453	45,000	52,000	60,000
20-24	44	59,435	12,881	50,050	59,200	67,310
25-29	48	61,885	16,977	50,508	57,250	72,300
30-34	55	72,963	30,000	53,000	65,000	81,000
35-39	84	65,264	26,105	49,500	59,500	78,302
40 Or More	36	67,110	29,302	51,500	60,400	80,000
PhD						
Total	533	66,281	26,300	49,750	61,000	75,500
5-9	52	43,905	3,342	41,750	44,050	46,740
10-14	92	52,143	8,314	46,310	51,000	56,660
15-19	85	62,249	16,510	52,300	60,000	69,800
20-24	84	68,373	18,943	56,100	66,972	78,600
25-29	85	72,131	18,526	59,200	69,000	82,600
30-34	59	79,063	27,177	62,840	75,000	87,000
35-39	56	83,075	30,913	62,700	74,898	92,250
40 Or More	20	88,240	72,565	60,000	67,500	84,600

Note: Cells with fewer than 15 cases have been suppressed.

SALARIES of MEN CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and YEARS SINCE BS
1987 ACS Salary Survey

Degree and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	573	52,586	25,592	36,500	48,600	62,000
2-4	65	28,884	4,916	25,500	29,000	32,500
5-9	74	37,439	8,796	32,000	38,000	41,220
10-14	53	43,380	11,568	36,400	44,000	50,000
15-19	30	49,392	13,139	38,000	47,900	56,000
20-24	31	56,074	16,446	46,700	52,000	61,000
25-29	59	61,658	26,042	46,000	55,000	74,800
30-34	63	64,271	18,772	51,120	60,252	76,000
35-39	131	65,430	35,118	47,000	58,000	75,000
40 Or More	57	59,776	20,021	45,000	58,680	71,000
MS						
Total	462	57,576	30,647	41,800	52,000	65,000
2-4	17	32,224	3,643	31,500	32,100	34,200
5-9	71	38,152	7,335	33,000	37,000	43,400
10-14	60	56,156	59,051	41,000	47,722	53,800
15-19	49	53,522	11,137	45,500	52,000	60,000
20-24	41	59,445	13,245	50,000	58,400	67,620
25-29	48	61,885	16,977	50,508	57,250	72,300
30-34	55	72,963	30,000	53,000	65,000	81,000
35-39	84	65,264	26,105	49,500	59,500	78,302
40 Or More	36	67,110	29,302	51,500	60,400	80,000
PhD						
Total	510	67,143	26,446	51,000	62,200	76,000
5-9	38	44,279	3,338	42,444	44,410	47,000
10-14	87	52,438	8,383	46,860	51,000	57,000
15-19	83	62,460	16,649	52,300	60,000	70,000
20-24	84	68,373	18,943	56,100	66,972	78,600
25-29	84	71,824	18,418	59,100	69,000	82,550
30-34	58	79,668	27,011	64,000	75,000	87,000
35-39	56	83,075	30,913	62,700	74,898	92,250
40 Or More	20	88,240	72,565	60,000	67,500	84,600

Note: Cells with fewer than 15 cases have been suppressed.

Table 1.1.3

SALARIES of WOMEN CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and YEARS SINCE BS
1987 ACS Salary Survey

Degree and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	41	32,780	10,459	29,000	30,630	36,000
2-4	20	28,393	5,995	24,020	29,520	32,110
MS						
Total	33	40,661	8,748	35,000	38,500	45,000
5-9	18	38,641	6,285	35,000	37,455	41,600
PhD						
Total	23	47,151	12,035	42,000	44,100	47,500

Note: Cells with fewer than 15 cases have been suppressed.

SALARIES of CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and RESPONSIBILITY SCORE
1987 ACS Salary Survey

Degree and Responsibility Score	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	584	51,080	25,151	35,000	47,000	60,000
4-8	48	30,688	10,978	22,900	28,300	35,050
9-12	219	41,010	12,577	31,720	39,100	48,000
13-17	211	53,056	16,863	41,100	52,000	63,600
18-20	106	77,185	38,261	57,288	70,000	90,000
MS						
Total	517	55,509	29,333	40,700	50,000	63,000
4-8	30	37,614	9,335	32,000	35,050	42,800
9-12	208	45,795	11,828	36,570	45,000	52,190
13-17	199	58,460	35,349	44,000	53,640	65,000
18-20	80	80,135	32,917	61,550	75,050	90,750
PhD						
Total	573	65,728	25,800	49,200	60,700	75,696
4-8	16	46,766	9,343	41,500	46,330	53,950
9-12	229	54,418	12,135	45,500	52,000	60,060
13-17	232	67,758	17,195	55,000	66,000	77,140
18-20	96	90,963	43,582	70,500	83,800	99,200

Note: Cells with fewer than 15 cases have been suppressed.

A respondent's responsibility score is derived from adding the responses to Questions VI. A through D on the questionnaire.

Table 1.2.2

SALARIES of MEN CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and RESPONSIBILITY SCORE
1987 ACS Salary Survey

Degree and Responsibility Score	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	544	52,399	25,397	36,450	48,000	61,000
4-8	39	31,374	11,646	22,800	28,100	38,000
9-12	196	42,217	12,592	33,400	40,000	49,300
13-17	203	53,326	16,885	41,700	52,000	63,600
18-20	106	77,185	38,261	57,288	70,000	90,000
MS						
Total	483	56,557	29,986	41,000	51,660	65,000
4-8	28	38,086	9,478	32,000	35,950	42,940
9-12	183	46,551	12,025	38,000	46,000	53,600
13-17	192	58,963	35,859	45,000	55,000	65,200
18-20	80	80,135	32,917	61,550	75,050	90,750
PhD						
Total	547	66,551	25,981	50,000	62,000	76,200
9-12	214	55,131	12,177	46,300	52,410	61,400
13-17	224	68,214	17,003	55,000	66,400	77,340
18-20	95	91,173	43,764	70,000	84,000	100,000

Note: Cells with fewer than 15 cases have been suppressed.

A respondent's responsibility score is derived from adding the responses to Questions VI. A through D on the questionnaire.

Table 1.2.3

SALARIES of WOMEN CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and RESPONSIBILITY SCORE
1987 ACS Salary Survey

Degree and Responsibility Score	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Total	39	32,553	10,530	28,000	30,630	36,000
9-12	23	30,729	6,220	29,000	30,200	33,000
MS						
Total	34	40,618	8,724	33,000	39,450	45,000
9-12	25	40,261	8,683	35,000	37,910	45,000
PhD						
Total	26	48,403	12,677	42,000	44,200	48,000
9-12	15	44,245	4,868	40,800	44,000	46,320

Note: Cells with fewer than 15 cases have been suppressed.

A respondent's responsibility score is derived from adding the responses to Questions VI. A through D on the questionnaire.

Table 1.3.1

SALARIES of CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to DEGREE and EMPLOYER
1987 ACS Salary Survey

Degree & Employer	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
BS						
Non-Manufacturing	90	51,617	24,005	36,000	47,770	62,000
Basic Chemicals	37	71,072	54,258	47,400	57,400	78,700
Specialty Chemicals	103	52,873	21,968	35,000	50,000	65,000
Electronics	35	40,770	12,559	30,300	38,760	52,000
Petroleum/Natural Gas	33	60,423	21,583	46,000	57,500	77,000
Pharmaceuticals	28	51,347	20,269	32,952	51,250	63,100
Plastics	43	47,399	18,509	33,240	45,000	58,680
Other Manufactures	246	48,431	21,924	33,280	43,590	57,000
MS						
Non-Manufacturing	82	58,694	53,617	41,000	49,000	62,500
Basic Chemicals	49	64,100	22,667	50,000	60,000	76,000
Specialty Chemicals	85	59,776	27,354	42,000	55,000	69,000
Electronics	27	44,583	15,481	35,400	42,500	48,000
Petroleum/Natural Gas	34	64,851	24,084	47,944	59,110	80,000
Pharmaceuticals	40	51,840	23,073	39,000	45,800	57,090
Plastics	41	55,508	27,285	38,000	50,000	60,800
Other Manufactures	175	51,462	16,290	38,000	50,000	60,000
PHD						
Non-Manufacturing	88	67,322	28,744	48,750	58,100	79,000
Basic Chemicals	56	78,929	50,041	53,300	64,900	89,000
Specialty Chemicals	86	61,814	18,597	48,000	58,750	73,000
Electronics	21	54,442	12,735	45,500	49,600	65,000
Petroleum/Natural Gas	100	71,470	20,891	55,500	70,000	81,750
Pharmaceuticals	28	63,525	16,611	52,600	61,500	70,400
Plastics	38	58,629	15,968	44,300	55,000	70,000
Other Manufactures	163	63,842	21,609	48,000	61,000	74,100

Note: Cells with fewer than 15 cases have been suppressed.
The "other manufactures" category includes agricultural chemicals, biochemicals, coatings and paints, food, glass, paper, rubber, soaps and detergents, steel or ferrous metals, and other metals or minerals.

Table 1.4.1

SALARIES of BS CHEMICAL ENGINEERS employed FULL-TIME in INDUSTRY
according to WORK FUNCTION, and YEARS SINCE BS
1987 ACS Salary Survey

Work Function and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
R&D Mgt						
Total	59	65,882	20,270	54,000	62,160	79,000
35-39	19	72,421	19,604	58,000	67,900	79,000
Applied Research						
Total	164	43,164	15,598	31,200	39,388	51,750
2-4	34	29,638	4,145	26,000	30,100	32,500
5-9	31	34,107	7,727	30,000	32,280	36,000
30-34	17	55,351	14,836	46,500	51,120	60,000
35-39	26	55,844	16,369	44,000	51,650	69,000
General Mgt						
Total	103	68,726	38,847	50,000	61,000	76,000
35-39	33	80,589	55,295	58,000	65,000	85,000
Marketing						
Total	96	51,916	23,936	37,000	49,850	60,000
35-39	25	63,391	29,261	44,000	56,000	72,000
Production						
Total	88	41,706	15,258	31,850	39,250	48,900
5-9	20	38,008	4,710	35,100	38,390	39,920
Consulting						
Total	22	42,409	18,662	28,000	39,500	51,000
Other						
Total	79	46,239	17,726	33,300	45,100	54,701
35-39	16	55,126	24,820	40,550	50,500	64,300

Note: Cells with fewer than 15 cases have been suppressed.
The "other" category includes basic research, forensics, writing, chemistry information services, and computer programming.

Table 1.4.2

SALARIES of BS CHEMICAL ENGINEERS employed FULL-TIME
according to GEOGRAPHIC REGION, and YEARS SINCE BS
1987 ACS Salary Survey

Geographic Region & Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
Pacific						
Total	60	51,444	22,227	35,000	44,500	60,500
Mountain						
Total	16	42,050	16,510	31,094	47,556	49,250
West North Central						
Total	29	42,570	16,518	30,000	36,600	52,000
West South Central						
Total	45	59,280	22,446	39,100	57,000	78,500
East North Central						
Total	140	49,940	22,496	33,390	44,000	61,680
2-4	21	29,708	4,050	27,500	30,000	32,500
5-9	18	36,641	8,362	31,500	35,850	40,000
25-29	21	49,609	19,536	39,900	48,000	57,660
35-39	30	67,773	27,565	50,000	63,300	76,000
East South Central						
Total	15	50,913	20,673	38,500	52,000	60,000
Middle Atlantic						
Total	147	52,984	32,548	36,400	49,000	60,000
2-4	21	28,057	4,759	25,000	28,000	32,500
10-14	15	46,014	15,769	37,000	46,893	55,120
30-34	16	57,375	17,228	43,414	54,210	74,000
35-39	39	62,910	50,577	44,000	52,800	64,000
40 Or More	19	58,757	23,736	44,000	55,000	71,000
South Atlantic						
Total	98	48,469	22,941	34,500	45,500	57,600
2-4	17	27,646	6,388	22,800	27,310	31,200
5-9	19	36,720	8,784	31,000	38,000	41,220
35-39	16	68,663	30,477	53,300	61,100	76,400
New England						
Total	55	52,473	21,379	35,800	46,000	64,700

Note: Cells with fewer than 15 cases have been suppressed.

Table 1.5.1

SALARIES of MS CHEMICAL ENGINEERS employed FULL-TIME
according to WORK FUNCTION, and YEARS SINCE BS
1987 ACS Salary Survey

Work Function and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
R&D Mgt						
Total	53	71,403	25,123	52,000	70,000	80,000
Applied Research						
Total	169	45,678	12,165	36,000	44,000	52,400
5-9	50	39,317	7,142	33,000	38,200	45,000
10-14	34	45,582	8,512	40,000	45,000	50,000
15-19	15	49,102	8,974	42,000	49,000	53,600
35-39	20	52,287	19,962	38,000	46,370	62,500
General Mgt						
Total	86	75,383	31,731	52,000	70,750	83,616
30-34	18	83,898	34,722	62,000	79,000	96,000
35-39	19	88,912	31,766	70,000	80,000	101,500
Marketing						
Total	56	53,818	13,132	44,000	55,000	62,250
Production						
Total	39	47,864	13,145	36,000	48,600	57,500
Consulting						
Total	30	66,232	83,478	40,000	52,350	63,000
Other						
Total	59	50,072	13,895	40,000	49,150	59,000

Note: Cells with fewer than 15 cases have been suppressed.
The "other" category includes basic research, forensics, writing, chemistry information services, and computer programming.

Table 1.5.2

SALARIES of MS CHEMICAL ENGINEERS employed FULL-TIME
according to GEOGRAPHIC REGION, and YEARS SINCE BS
1987 ACS Salary Survey

Geographic Region & Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
Pacific						
Total	43	53,265	16,765	41,600	50,000	60,000
West North Central						
Total	25	53,704	22,764	35,400	50,000	62,100
West South Central						
Total	48	58,025	17,673	46,500	57,550	67,500
East North Central						
Total	79	55,641	18,685	40,000	52,000	67,000
35-39	17	59,449	20,458	43,000	52,000	77,604
Middle Atlantic						
Total	159	59,532	44,007	41,000	51,000	66,000
5-9	26	37,123	9,500	29,440	36,270	44,000
10-14	24	66,122	92,736	42,250	46,100	50,000
15-19	15	56,792	11,271	49,680	53,600	61,000
20-24	17	59,467	10,093	49,500	63,000	67,000
30-34	16	80,619	35,785	56,650	74,750	93,500
35-39	25	67,814	32,771	50,000	61,152	74,000
South Atlantic						
Total	66	57,134	26,452	40,000	52,690	62,100
New England						
Total	50	52,496	18,518	41,000	48,300	60,000

Note: Cells with fewer than 15 cases have been suppressed.

Table 1.6.1

SALARIES of PhD CHEMICAL ENGINEERS employed FULL-TIME
according to WORK FUNCTION, and YEARS SINCE BS
1987 ACS Salary Survey

Work Function and Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
R&D Mgt						
Total	107	77,561	22,044	65,000	71,600	84,000
15-19	22	73,008	19,227	63,500	68,100	77,280
20-24	23	71,019	10,107	68,500	70,800	75,500
25-29	21	85,994	20,055	71,000	81,000	98,000
Basic Research						
Total	24	54,531	17,853	43,200	46,700	57,122
Applied Research						
Total	265	57,864	14,150	47,500	55,000	64,900
5-9	38	43,556	3,668	41,000	43,751	46,560
10-14	60	50,674	6,882	46,200	49,350	54,000
15-19	44	57,556	9,674	50,450	55,500	62,200
20-24	36	61,322	13,321	54,000	58,000	63,350
25-29	36	65,645	12,399	58,750	63,680	70,250
30-34	25	69,835	16,708	60,700	73,500	78,000
35-39	21	70,732	16,377	60,000	70,668	76,000
General Mgt						
Total	48	97,081	53,347	74,800	84,750	99,200
Marketing						
Total	23	66,550	17,319	50,000	66,000	80,000
Consulting						
Total	22	63,938	18,154	48,000	60,500	76,000
Other						
Total	44	63,376	25,186	49,500	60,000	67,150

Note: Cells with fewer than 15 cases have been suppressed.
The "other" category includes production, forensics, writing, chemistry information services, and computer programming.

Table 1.6.2

SALARIES of PhD CHEMICAL ENGINEERS employed FULL-TIME
according to GEOGRAPHIC REGION, and YEARS SINCE BS
1987 ACS Salary Survey

Geographic Region & Years Since BS	Count	Mean	Standard Deviation	25th %-ile	50th %-ile	75th %-ile
Pacific						
Total	56	65,010	20,313	53,500	62,350	75,500
15-19	15	56,567	15,069	54,000	58,000	65,100
West North Central						
Total	21	62,180	20,235	43,500	62,000	73,500
West South Central						
Total	78	64,012	19,229	50,000	60,000	77,400
10-14	18	56,084	9,020	49,800	55,990	60,300
15-19	18	63,119	15,098	49,500	60,030	75,500
20-24	16	71,518	20,521	58,150	73,050	82,100
East North Central						
Total	85	65,041	25,200	48,000	60,700	70,800
10-14	18	50,476	6,233	46,300	48,750	55,026
25-29	15	69,343	12,508	65,000	70,000	80,000
Middle Atlantic						
Total	148	67,497	22,481	49,050	64,700	79,750
5-9	19	44,204	3,702	41,000	44,300	47,800
10-14	26	51,693	8,995	45,500	48,300	54,000
20-24	27	67,636	13,491	55,200	67,704	80,000
25-29	22	78,767	16,559	64,400	74,500	90,000
30-34	16	86,569	18,899	76,800	86,000	98,000
35-39	17	92,102	33,448	73,600	84,840	106,000
South Atlantic						
Total	63	68,953	46,669	47,500	58,200	73,000
New England						
Total	56	68,577	25,644	53,600	61,000	80,000

Note: Cells with fewer than 15 cases have been suppressed.

American Chemical Society

OFFICE OF THE
EXECUTIVE DIRECTOR

1155 SIXTEENTH STREET, N.W.
WASHINGTON, D.C. 20036
Phone (202) 872-4600

February 24, 1987

Dear Colleague:

Each year the American Chemical Society studies the economic status of the U.S. chemical profession by surveying a sample of ACS members. You are one of about 25,000 members I am asking to participate in this survey, conducted under the aegis of the Joint Board-Council Committee on Economic Status. This year, the ACS will conduct a special study of the economic status of member chemical engineers. This year's sample, therefore, includes more than the usual number of chemical engineers.

Because a high response rate is needed to assure accurate results, your participation is an important service to our colleagues. Please take a few minutes now to complete the questionnaire and return it in the enclosed business reply envelope. The procedure is confidential, and the information you provide will be reported only as a part of aggregated data.

Findings will be reported to ACS members in several ways. Preliminary results will be presented at the spring meeting in Denver; early in the summer, the ACS will publish detailed analyses as Salaries 1987. At about the same time, Chemical and Engineering News will publish a cover story on the salaries and employment status of chemists and chemical engineers.

Please feel free to use the back of the questionnaire for whatever comments or suggestions you might care to make.

Thank you for your assistance.

Sincerely,

John K Crum

John K Crum

Encl.

AMERICAN CHEMICAL SOCIETY

1987 Comprehensive Salary and Employment Status Survey

I. EDUCATION AND EMPLOYMENT STATUS

A. PLEASE INDICATE THE YEAR IN WHICH YOU EARNED ANY OF THE FOLLOWING DEGREES:

Bachelor's	19 __ __	1-2
Master's	19 __ __	3-4
Doctorate	19 __ __	5-6

B. PLEASE CHECK THE APPROPRIATE BOX IN EACH COLUMN.

	Field of highest degree	ONE specialty most related to your current or most recent job
Chemical engineering	☐ 01	☐ 01
Biochemistry	☐ 02	☐ 02
General chemistry	☐ 03	☐ 03
Agricultural/food chemistry	☐ 04	☐ 04
Analytical chemistry	☐ 05	☐ 05
Clinical chemistry	☐ 06	☐ 06
Environmental chemistry	☐ 07	☐ 07
Inorganic chemistry	☐ 08	☐ 08
Materials science	☐ 09	☐ 09
Medicinal/pharmaceutical chemistry	☐ 10	☐ 10
Organic chemistry	☐ 11	☐ 11
Physical chemistry	☐ 12	☐ 12
Polymer chemistry	☐ 13	☐ 13
Other chemical science	☐ 14	☐ 14
Business Administration	☐ 15	☐ 15
Other Non-chemistry	☐ 16	☐ 16

7-10

C. Were you unemployed at any time during the calendar year 1986?

No ☐ 1 Yes ☐ 2 11

If yes, how many total weeks were you not employed and actively seeking employment during calendar year 1986?

__ __ weeks (ENTER A NUMBER FROM 1 TO 52) 12-13

D. PLEASE ENTER YOUR PRIMARY EMPLOYMENT STATUS AS OF MARCH 1, 1987. CHOOSE THE ONE CATEGORY THAT BEST FITS YOUR SITUATION.

Employed full-time (35 hours or more per week)	☐ 1
Employed part-time	☐ 2
Postdoctoral or other fellowship	☐ 3
Not employed but actively seeking employment	☐ 4
Not employed and NOT seeking employment	☐ 5

14

G. If you were UNEMPLOYED on March 1, how long had you been unemployed?

Less than 1 month	☐ 1
1 to 3 months	☐ 2
4 to 6 months	☐ 3
7 to 12 months	☐ 4
More than 1 year	☐ 5

15

H. If you were EMPLOYED on March 1, what are the first three digits of the zip code where you work?

__ __ __ 16-18

II. QUESTIONS ABOUT YOURSELF

A. Your sex:

Male ☐ 1 Female ☐ 2 19

B. Your marital status:

Single ☐ 1 Married ☐ 2 20

C. Age at last birthday before March 1, 1987.

__ __ years old 21-22

D. Citizenship or visa status:

U.S. native	☐ 1
U.S. naturalized	☐ 2
U.S. permanent resident visa	☐ 3
Other visa	☐ 4

23

E. Race or ethnic group:

American Indian or Alaskan Native	☐ 1
Asian or Pacific Islander	☐ 2
Black (not of Hispanic origin)	☐ 3
Hispanic	☐ 4
White	☐ 5
Other race or ethnic group	☐ 6

24

F. Please enter the two-letter post office abbreviation for the STATE in which you live.

__ __ 25-26

IF YOU ARE NOT CURRENTLY EMPLOYED, PLEASE SKIP TO SECTION IV, MOST RECENT OR CURRENT JOB.

III. CURRENT INCOME

A. If you are CURRENTLY EMPLOYED, how long have you worked for your current employer?

__ __ years __ __ months 27-30

B. BASE ANNUAL SALARY from PRINCIPAL JOB as of March 1, 1987. (DO NOT INCLUDE payments for bonus, second job, overtime work, summer teaching, or other supplemental earnings or employment.) If zero, please indicate. If on a 9 or 10 month contract, report the 9 or 10 month salary rather than an annualized salary.

$ _____ per year 31-36

C. TOTAL PROFESSIONAL INCOME during calendar year 1986. (INCLUDE consulting fees, base annual salary, income from second job, bonuses, payments for overtime, summer teaching, and other supplemental earnings.)

$ _____ per year 37-42

D. If you are currently employed, does your employer pay your ACS dues?

Yes ☐ 1 No ☐ 2 43

IV. DESCRIBE YOUR CURRENT OR MOST RECENT JOB.

IF YOUR CURRENT OR MOST RECENT EMPLOYER IS NOT AN ACADEMIC INSTITUTION, GO TO SECTION V AT THE TOP OF THE NEXT COLUMN.

CURRENT OR MOST RECENT EMPLOYMENT IS IN AN ACADEMIC INSTITUTION.

A. Current (or most recent) principal employer.

1. Public institution ☐ 1 Private institution ☐ 2 44

2. High school ☐ 1
   Medical or professional school ☐ 2
   College or university where the highest degree offered in chemical science is:
   - Associate ☐ 3
   - Bachelor's ☐ 4
   - Master's ☐ 5
   - Doctorate ☐ 6 45

B. Your academic rank:

- Full professor ☐ 1
- Associate professor ☐ 2
- Assistant professor, tenure track ☐ 3
- Instructor, lecturer, or non-tenure track ☐ 4
- Non-teaching research associate ☐ 5
- My institution does not have ranks ☐ 6 46

C. Have you been granted tenure?

Yes ☐ 1 No ☐ 2 47

D. Your basic contract is for a period of:

- 9 or 10 months ☐ 1
- 11 or 12 months ☐ 2 48

E. About what fraction of your total academic year assignment is devoted to:

	1/4 or less	1/3	1/2	2/3	3/4	full-time	
Teaching	☐	☐	☐	☐	☐	☐	49
Research	☐	☐	☐	☐	☐	☐	50
Administration	☐	☐	☐	☐	☐	☐	51
Other	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	52

F. What was your principal professional activity during the SUMMER OF 1986?

- Teaching ☐ 1
- Funded research or study ☐ 2
- Unpaid scholarly/academic ☐ 3
- Administration ☐ 4
- Consulting ☐ 5
- Non-academic employment ☐ 6
- Other ☐ 7 53

THANK YOU. YOU HAVE COMPLETED THE QUESTIONNAIRE. PLEASE USE THE BLANK SPACE ON THE BACK OF THIS QUESTIONNAIRE FOR COMMENTS.

V. CURRENT OR MOST RECENT EMPLOYMENT IS NOT IN AN ACADEMIC INSTITUTION.

A. Current (or most recent) principal employer.

- Self-employed ☐ 01
- Private industry
  - Non-manufacturing ☐ 02
  - Manufacturing
    - Basic chemicals ☐ 03
    - Specialty chemicals ☐ 04
    - Agricultural chemicals ☐ 05
    - Biochemical products ☐ 06
    - Coatings and paints ☐ 07
    - Electronics ☐ 08
    - Food ☐ 09
    - Glass, ceramics ☐ 10
    - Paper ☐ 11
    - Petroleum/natural gas ☐ 12
    - Pharmaceuticals, personal care ☐ 13
    - Plastics ☐ 14
    - Rubber ☐ 15
    - Soaps, detergents, surfactants ☐ 16
    - Steel or ferrous metals ☐ 17
    - Other metals, minerals ☐ 18
    - Other manufactures (specify) _____ ☐ 19
- Government
  - Federal (civilian) ☐ 20
  - State or local ☐ 21
  - Military ☐ 22
- Other non-academic
  - Hospitals, independent laboratory ☐ 23
  - Non-profit organization, other research institution ☐ 24
  - Other employment ☐ 25 54–55

B. Check the ONE work function that best describes your job.

- Research and Development
  - Management or administration of R&D ☐ 01
  - Basic research ☐ 02
  - Applied research, development, design ☐ 03
- General management, administration (other than research and development) ☐ 04
- Marketing, sales, purchasing, technical service, economic evaluation ☐ 05
- Production, quality control ☐ 06
- Forensic analysis, other laboratory analysis ☐ 07
- Writing, editing, abstracting ☐ 08
- Chemistry information services ☐ 09
- Computer programming, analysis, design ☐ 10
- Consulting ☐ 11
- Other ☐ 12 56–57

C. Were you eligible for a bonus during calendar 1986?

Yes ☐ 1 No ☐ 2 58

D. Did you receive a bonus during calendar 1986?

Yes ☐ 1 No ☐ 2 59

IF yes, please indicate amount

$_____ 60–64

VI. LEVEL OF RESPONSIBILITY:

Please examine the statements within each of the four groups (Duties, Technical Decisions and Recommendations, Supervision Received, and Supervision Exercised) and, within each group, check the box of the statement that most closely corresponds to your responsibility on the job.

A. Duties:

I receive on-the-job training working on simple projects or assisting more senior staff. . . . . ☐ 1

I perform responsible and varied assignments within projects . . . . . ☐ 2

I plan, conduct, and coordinate projects of some complexity . . . . . ☐ 3

I undertake long-term and short-term planning and supervision of projects. I make decisions on work programs and have budgetary control of projects . . . . . ☐ 4

I have full managerial responsibility for a function with full responsibility for the operation of a budget and long term planning . . . . . ☐ 5 65

B. Technical Decisions and Recommendations:

I am responsible for minor technical details only, all other matters being checked. . . . . ☐ 1

I am responsible for technical detail which is reviewed overall . . . . . ☐ 2

I am responsible for technical matters but am subject to occasional review. . . . . ☐ 3

I have full technical responsibility for projects. . . . . ☐ 4

I am responsible for all technical matters including the delegation of responsibility . . . . . ☐ 5 66

C. Supervision Received:

My work is assigned with detailed instructions, guidance being always available. My results are subject to close scrutiny . . . . . ☐ 1

My work is assigned in terms of detailed objectives and priorities, guidance being available on problems and unusual features. My work is subject to scrutiny. . . . . ☐ 2

My work is assigned in terms of general objectives and priorities, guidance being available on policy or unusually complex problems. My work is reviewed for effectiveness only . . . . . ☐ 3

My work is such that I receive executive instruction on broad overall objectives and it is reviewed only for its general effectiveness and adherence to policy . . . . . ☐ 4

My work is unsupervised, other than I comply with the policy decided within the governing body. . . . . ☐ 5 67

D. Supervision Exercised:

I have no authority but may give technical guidance to juniors working on the same project. . . . . ☐ 1

I have no managerial responsibilities for qualified staff but may be assigned graduates, technicians, or other juniors as assistants from time to time . . . . . ☐ 2

I supervise a group of qualified staff, technicians, and other employees. I assign and review their work. I can recommend on the selection, discipline, rating, training, and perhaps rate of pay . . . . . ☐ 3

I am responsible for leaders of groups containing qualified staff, technicians, and other employees. I give guidance on policy and complex technical matters delegating responsibility for discipline, rating, training, and rates of pay . . . . . ☐ 4

I have full control over senior staff who are in turn responsible for groups of qualified staff and other employees . . . . . ☐ 5 68

THANK YOUR FOR YOUR PARTICIPATION.

PLEASE RETURN THIS QUESTIONNAIRE TO
ACS STATISTICAL SERVICES,
Room 202, 1155 16th Street NW, Washington, DC 20036

ACS OFFICE OF STATISTICAL SERVICES PUBLICATIONS

Salaries: The Office of Statistical Services annually surveys the ACS membership, gathering detailed information on member chemists and chemical engineers. The reports based on this survey contain statistical tables describing the respondents' employment status, employer, work function and specialty, salaries, and demographic characteristics.

Reports are available for each year from 1973 through the current year. In 1987, four separate reports are available: *1987 Salaries of Non- Academic Chemists, 1987 Salaries of Non-Academic Chemical Engineers, 1987 Salaries of Academic Chemists,* and *1987 Employment Status and Demographic Characteristics of ACS Members.*

Starting Salaries: The Office of Statistical Services also surveys new graduates in chemistry and chemical engineering each summer, and publishes reports detailing the graduates' employment status, post-graduation plans, starting salaries, and other employment and demographic characteristics.

Reports are available for each year from 1975 through the current year.

Professionals in Chemistry: The *Professionals in Chemistry* series compiles information concerning chemists and chemical engineers from ACS, government, and private industry sources. It details information on demography, employment, salaries, education, and supply and demand for the entire chemical profession.

Reports are available for each year from 1975 through 1978, and combined reports for 1979-1980, 1981-82, 1983-84, and 1985-86.

Special Reports:

1975 Report of Chemists' Salaries and Employment Status Supplement: Economic Status of Women in the ACS.

Women Chemists 1980: A supplemental report on the ACS's 1980 Survey of Salaries and Employment.

Women Chemists 1985: A supplemental report on the ACS's 1985 Survey of Salaries and Employment.

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